

madge (*Nautilus*, 68 (2), October 1954). This subspecies was based upon a series of specimens, collected by Mr. Ray Baxter, on Sister Rock, an islet off the southern Oregon coast. Until 1960 the original lot was the only known series of this race. The holotype had been deposited in the California Academy of Sciences in San Francisco, California.

Early in 1960, Mr. Munroe Walton, while gathering topotypes of the various genera and species of the land mollusks, obtained a very fine series of *Monadenia fidelis baxteriana*, not only from the islet, but also from the opposite mainland. A careful examination of this larger series has caused me to revise my diagnosis as to the status of this race.

Evidence, based on the additional specimens, now indicates that this "race" is only part of an ecological cline, blending in with adjacent mainland populations. The specimens from both the islet and the opposite headland are dwarfed, some more so than others. Specimens collected adjacent to this rather small area are more or less the same as the major mainland race, the *Monadenia fidelis beryllica* Chace (*Nautilus*, 48, 1935). As noted by all collectors who have worked the genus, populations vary from locality to locality, which makes a typical species extremely difficult to describe.

It is now obvious that this dwarfed population is part of an ecological cline rather than the usual geographical race. That there is definite contact between the more or less normal populations both to the north and south is indicated by some specimens being fully as large as the adjacent populations. That at least a partial separation exists is indicated by the large number of dwarfed shells. As this cline inhabits an ecological condition that is more or less unfavorable to the genus, the dwarfing could be considered a normal consequence. As the islet is rather close to shore, probably the geographical isolation has not existed for a long enough period in geological time to complete the evolution into a distinct subspecies.

Therefore, I feel at this time that it is best to place *Monadenia fidelis baxteriana* in the synonymy of *M. f. beryllica*, utilizing the name, if desired, to refer to the members of this rather localized dwarfed population.



Note on the Bivalved Gastropod *Berthelinia limax* (KAWAGUTI & BABA, 1959)

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On 21 August 1960 Dr. Siro Kawaguti, Professor of Zoology, Department of Biology, Okayama University, Japan, flew from Tokyo to San Francisco with living examples of his new bivalved gastropod *Berthelinia limax* and a liberal supply of its green food alga *Caulerpa okamurai*. On arrival early in the morning of 22 August, Dr. Kawaguti was met by a vehicle from the Steinhart Aquarium of the California Academy of Sciences and taken to the Aquarium for the proper handling of his specimens, which he brought over in small round plastic containers in his brief case.

Shortly after arrival at the Aquarium arrangements were made to transfer the specimens to open, wide-mouthed glass jars of quart size along with a small amount of the food alga in each jar. It seemed probable, from temperature tolerances in the Okayama University laboratory, where Dr. Kawaguti had been eminently successful in raising specimens of *Berthelinia*, that clean salt water from the Aquarium's normal salt system (60-65° F. range) would be satisfactory. Therefore, the Japan Sea water was changed gradually to Pacific Ocean water so as to inhibit the possibility of undue shock in the transfer.

Dr. Kawaguti's living specimens were of several sizes (ages) and included one lot of *Caulerpa* with egg masses. After transfer, Jar #1 contained two adult animals, a third being added on discovery in the surplus lot of *Caulerpa* on 8 September. On 24 August two of the adults were observed in copulating position but whether egg masses were laid later could not be determined with certainty. One of the adults died on or about 20 September; another, on 28 September; and the third (the largest of the three) on 29 September.

In Jar #2 one half-grown specimen was observed on 8 September and one more of like size on 12 September. On 7 October both were still alive and active but on 10 October one died, followed by the other on 12 October.

Jar #3 contained *Caulerpa* with egg masses. At least one and possibly more of these hatched about 25 August and the next day Dr. Kawaguti observed them alive. Under the microscope

the thin, transparent, colorless, spiral shell of the nuclear stage could be seen along with the active animal. The operculum was observed attached to the foot. These newly hatched veligers evidently did not survive more than a day or so. Finally, the detritus at the bottom of the jar was filtered and over 100 of the minute nuclear spiral shells were recovered. These were mounted in slides using the technique for mounting foraminifera.

The ability to keep these small bivalved gastropods alive from 22 August to 12 October (52 days) in a different type of sea water seems worthy of record even though Dr. Kawaguti stated he had raised them through five generations in his laboratory. Obviously, these animals must have considerable tolerance to varying conditions of temperature and sea-water content.

Following Dr. Kawaguti's instructions, the jars were placed in full light during the day but away from direct sunlight. As portions of the *Caulerpa* died and became colorless, they were removed. Water was changed every three or four days, gradually by decanting and re-filling with new normal salt water from the Aquarium. No attempt was made to aerate the water in the jars or to oxygenate it. Although all specimens of *B. limax* finally died, a fair amount of the Japanese *Caulerpa* is still in fairly good condition at this writing (29 October, 1960).

On their arrival and for a considerable time afterward the living animals were active and continued to feed on the alga. Occasionally, one would crawl up the side of a jar and across the water at the top, clinging to the meniscus. On two or three occasions an animal would drop down from the meniscus and hang by a thread of mucus a half inch to an inch long, finally dropping down to a branch of the alga or to the bottom of the jar. The bright green color of the animal and shell maintained for many days. The round adductor muscle scar was seen easily through the transparent shell. When fresh and active the animals are difficult to see, especially the smaller ones, as they blend so perfectly into their normal habitat. Toward the end of the experiment, however, the shells of living animals began to whiten and generally lose the brilliant gem-like green color. After death this green color was lost almost completely.



Notes on the Habitat of *Berthelinia* spec. nov. from the Vicinity of La Paz, Baja California, Mexico

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Living *Berthelinia* was first discovered on 3 August, 1960, at about an eight-foot depth close to shore among large blocks of lava broken away from the adjacent lava wall at the north end of the fine sand beach of Bahia Candelero, Isla Espiritu Santo. A small loose roll of a feathery type of green alga (*Caulerpa* sp. ?) was brought up from the bottom by Sra. Mary Lou Adcock, which on careful search produced several small living specimens. Because this type of alga grows in great quantity in the sand and on dead coral chunks of the Bay, and was not at all prevalent in the rocky terrain, operations were transferred to the sandy area, a move of not more than 100 yards from the point of discovery. Large masses of *Caulerpa* were brought up from five to eight feet of water and placed in a large plastic bucket. Search of this produced more living specimens, along with a few living specimens of the sacoglossan *Oxynoe*. Temperature of the water was 82-84° F., with air temperature about the same.

Some of the living *Berthelinia* were placed in a plastic gallon-sized thermos jug along with a mass of the *Caulerpa* for transportation to San Francisco by plane the following day. Additional masses of the *Caulerpa* were thrown into buckets for transportation to San Francisco to permit later search for more specimens.

Unfortunately, the specimens of *Berthelinia* and *Oxynoe* did not survive. The *Caulerpa* was thickly inhabited by a small species of sea anemone which died also. Upon later careful sorting, the total of living specimens of *Berthelinia* found was brought up to nearly 40. The *Caulerpa* was inhabited also by quantities of minute mollusks, mostly gastropods with some pelecypods; occasional nudibranch egg masses were also noted. These were shaken out and preserved so as to obtain as complete a sample of the fauna as possible.

Opportunity was afforded to try for living *Berthelinia* again on 4 October. This time operations centered in the vicinity of Bahia Puerta Ballandra, on the mainland of the peninsula north of La Paz. The sand of this bay did not